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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/559,152	04/26/2006	Holger Dziallas	034166.006US	9050

441 7590 02/01/2011

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EXAMINER	
ENIN-OKUT, EDUE	

ART UNIT	PAPER NUMBER
1727	

MAIL DATE	DELIVERY MODE
02/01/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/559,152	DZIALLAS ET AL.	
	Examiner	Art Unit	
	Edu E. Enin-Okut	1727	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 March 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *14-20,22,23 and 25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *14-20,22,23 and 25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

MEMBRANE-ELECTRODE UNIT FOR DIRECT METHANOL FUEL CELLS AND METHOD FOR THE PRODUCTION THEREOF

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 12, 2010 has been entered. Applicant has amended claim 14 and added claim 25. Claims 14-20, 22 and 24 are pending.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Priority

3. In response to applicant's argument on p. 5 of its remarks filed on March 12, 2010, the discussion with respect to priority made in the previous Office Action continues to apply. That discussion is repeated below for convenience.

Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 120 as follows:

This application is claiming the benefit of prior-filed non-provisional Application No. 10/308,491 under 35 U.S.C. 120, 121, or 365(c) in an amendment to its specification filed on April 28, 2009. Since the reference to Application No. 10/308,491 was not filed submitted within the later of four months from the date on which the national stage commenced under 35 U.S.C.

371 (b) or (f) in the later-filed international application or sixteen months from the filing date of the prior-filed application (see 37 CFR 1.78(a)(2)(ii)), the benefit claim to the prior-filed non-provisional application is improper. (It is noted that Application No. 10/308,491 was filed on December 3, 2002 and this application entered the national stage on April 26, 2006.) Applicant is required to delete the reference to the prior-filed application from the first sentence(s) of the specification, or the application data sheet, depending on where the reference was originally submitted, unless applicant can establish that the reference was unintentionally delayed (see 37 CFR 1.78(a)(3)).

Claim Objections

4. Claim 25 is objected to because of the following informalities: The claim recites "... carbon fiber paper rendered hydrophobic PTFE." It appears that this phrase should be -- ... carbon fiber paper rendered hydrophobic ***by*** PTFE. --. Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. Claims 14, 18-20, 22 and 23 are rejected under 35 U.S.C. 102(e) as being anticipated by Wittpahl et al. (US 7,141,270 B2).

Regarding claim 14, Wittpahl teaches a method of manufacturing a membrane electrode assembly with an anode electrode and cathode electrode on it opposing surfaces (Abstract; Claim 1). The anode gas diffusion substrate was coated with catalyst ink and dried at 90° C (7: 52-55). The cathode side of the membrane was coated with catalyst ink and dried at 70° C (7: 59-61). The membrane is also coated with anode catalyst on its anode side and dried at 70° C (7:66 and 8:1-2). Finally, the membrane is combined with the gas distribution layers (8:8-10; Fig. 1).

Regarding claim 18, Wittpahl teaches the cathode catalyst layer load is 0.2 mg Pt/cm^2 (7:49-51)

Regarding claim 19, Wittpahl teaches the anode catalyst comprises of supported or unsupported precious metal blacks (platinum black) (5:66-67 and 6:1-3).

Regarding claim 20, Wittpahl teaches that cathode catalyst comprises of platinum (6:4-5).

Regarding claim 22, Wittpahl teaches that the membrane is rinsed in hot water having a temperature of 80° C (7:61-63 and 8:2-4).

Regarding claim 23, the method taught by Wittpahl is for producing a membrane electrode unit for a direct methanol fuel cell (1:7-10).

Claim Rejections - 35 USC § 103

6. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wittpahl et al. (US 7,141,270 B2) as applied to claims 14, 18-20, 22 and 23.

Wittpahl is applied and incorporated herein for the reasons above.

Regarding claim 25, although Wittpahl teaches that the gas distribution layers are hydrophobic-made carbon fiber papers (7:47-48, 7:52-53), Wittpahl does not expressly teach that the carbon fiber paper is rendered hydrophobic by PTFE. However, Wittpahl does teach that gas diffusion layers used in a membrane electrode assembly can be made of carbon fiber paper impregnated with a hydrophobic polymer, preferably polytetrafluoroethylene (PTFE) (1:34-40, 1:60-2:4). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use PTFE to render the carbon paper used in the gas diffusion layers employed in method of Wittpahl hydrophobic because Wittpahl teaches that it is a means with which to avoid the condensation of water in the pores of the gas diffusion layers (1:66-2:1).

7. Claims 14, 17, 18, 20, 23, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tabata et al. (US 2002/0071980 A1).

Regarding claim 14, Tabata teaches a method of forming a membrane electrode assembly ("membrane electrode unit"), useful in a fuel cell, where the both sides of an electrolyte membrane are coated by catalyst (Abstract; para. 59; Claims 1,6,7). The catalyst layers can be formed directly on the surface of an electrolyte membrane by spraying or screen printing (para. 9,24,43). (For example, a catalyst ink may be coated on one side of the membrane with the subsequent removal of the ink's solvent or dispersant (para. 45-48).) The catalyst is also coated on a gas diffusion layer and subsequently air dried (para. 60). The membrane electrode assembly is effective when the structure obtained by laminating a membrane/catalyst layer conjugate and a gas diffusion layer/catalyst layer conjugate is provided on at least one side of the assembly (either its anode side or the cathode side) (para. 23-26,31; Claims 1,6).

Tabata does not expressly teach that the method produces a membrane electrode unit *for direct methanol fuel cells* [emphasis added]; or, the catalyst layer is "dried".

As to the method producing a membrane electrode unit *for direct methanol fuel cells* [emphasis added], if the body of a claim fully and intrinsically sets forth all of the limitations of the claimed invention, and the preamble merely states, for example, the purpose or intended use of the invention, rather than any distinct definition of any of the claimed invention's limitations, then the preamble is not considered a limitation and is of no significance to claim construction (e.g., *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305, 51 USPQ2d 1161, 1165 (Fed. Cir. 1999); *Rowe v. Dror*, 112 F.3d 473, 478, 42 USPQ2d 1550, 1553 (Fed. Cir. 1997)). See MPEP 2111.02 (II).

As to the catalyst layer being "dried", it would have been obvious to one of ordinary skill in the art at the time of the invention to remove the catalyst ink solvent or dispersant used in the method of Tabata by drying because it is well-known in the art as a means with which to remove solvents from solids.

Regarding claim 17 and 18, Tabata teaches that the catalyst content for the anode and cathode should be 0.01-1 mg/cm^2, preferably 0.1-0.5 mg/cm^2 (para. 42). It has been held that obviousness exists where the claimed ranges overlap or lie inside ranges disclosed by the prior art. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP 2144.05 (I).

Regarding claim 20, Tabata teaches that the catalyst consists of a conductor on which catalyst particles, such as platinum and other precious metals, are supported (para. 40).

Regarding claim 23, Tabata does not expressly teach that its membrane electrode assembly ("membrane electrode unit"), described above, is *for direct methanol fuel cells* [emphasis added]. However, it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ 1647 (1987). See MPEP 2111.02 (II). However, because the membrane electrode unit of Tabata is structurally similar to that instantly disclosed, the membrane electrode unit appears capable of being operated as claimed with similar if not identical claimed characteristics.

Regarding claim 25, Tabata teaches that the method used gas diffusion media that can be prepared from a carbon paper coated with a fluororesin, like PTFE, containing carbon-based particles (para. 20,22,52).

8. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tabata et al. (US 2002/0071980 A1) as applied to claims 14, 17, 18, 20, 23, and 25 above, and further in view of Yamashita et al. (US 5,441,822).

Regarding claims 15 and 16, Tabata teaches the method for making a membrane electrode assembly as discussed above; however, the reference does not explicitly disclose the thickness of the catalyst layers. However, Yamashita teaches the thickness of the catalyst layer is within the range of 0.05 to 0.5 mm (50 to 500 μm) (5: 30-35). Figure 5 shows the relationship between catalyst thickness and cell voltage (5: 36-46). The fuel cell performance increases and then decreases after a certain thickness (figure 5 and 5: 36-39). Therefore, it would have been within the skill of one of ordinary skill in the art to include adjusting the catalyst thickness in the membrane electrode unit made using the method of Tabata to yield an optimum fuel cell voltage, as taught by Yamashita. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

9. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tabata et al. (US 2002/0071980 A1) as applied to claims 14, 17, 18, 20, 23, and 25 above, and further in view of Kindler (US 5,992,008).

Regarding claim 19, Tabata does not expressly teach the anode catalyst is a supported or unsupported bi-metallic platinum/ruthenium catalyst. Kindler teaches membrane electrode assembly for a fuel cell with an anode formed from supported or unsupported platinum–ruthenium alloy particles or a bimetallic powder (3:31-57). The fuel cell can suitably perform with a catalyst loading levels as low as of 1 mg/cm^2 (2:32-39). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a supported or unsupported bi-metallic platinum/ruthenium catalyst in an anode catalyst of the membrane

electrode assembly made using the method of Tabata because Kindler teaches that this anode catalyst can be effectively employed at relatively low catalyst loading levels.

10. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tabata et al. (US 2002/0071980 A1) as applied to claims 14, 17, 18, 20, 23, and 25 above, and further in view of Wittpahl et al. (US 7,141,270).

Regarding claim 22, Tabata does not expressly teach the method includes washing the coated anode gas diffusion substrate or the ionomer membrane with water. However, Wittpahl a method of producing membrane electrode assemblies for fuel cells that includes rinsing the membrane in hot water having a temperature of 80° C (Abstract; 7:61-63, 8:2-4). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include washing the ionomer membrane in the method of Tabata because Wittpahl teaches that rinsing the membrane with water after coating and drying is an effective means to clean the membrane prior to assembly of the membrane electrode unit.

Response to Arguments

11. Applicant's arguments filed March 12, 2010 have been fully considered but they are not persuasive. In sum, Applicant argues the following in its remarks:

> (a) "... The advantages of the claimed invention are striking and unexpected. ..." (p. 4-5);
>
> (b) "... *Wittpahl* '270 does not teach or suggest a process for manufacturing a MEU structure comprising a double layer anode or the unexpected advantages of such a MEU structure having a double layer anode. In contrast, *Wittpahl* discloses using double layer cathodes. ... In addition, since the present application is a CIP of *Wittpahl* '270, applicants respectfully request withdrawal of the rejection. ..." (p. 5); and,
>
> (c) Tabata does not teach ... " a method including the step of providing a non-coated cathode gas diffusion membrane and the step of uniting the coated anode

gas diffusion substrate and the non-coated cathode gas diffusion substrate with the ionomer membrane coated on both sides so that the anode side of the ionomer membrane faces the coated anode gas diffusion substrate and the cathode side of the ionomer membrane faces the non-coated cathode gas diffusion substrate." (p. 5).

In response to applicant's arguments, please consider the following:

(a) With respect to unexpected results, this argument is not applicable to a rejection under 35 U.S.C. 102(e).

(b) First, Wittpahl does teach the manufacture of a double layer anode electrode as discussed in the rejection above. Second, Wittpahl teaches that the method of manufacturing the membrane electrode assembly where either the cathode electrode or the anode electrode can include two sub-layers (see Wittpahl, Claim 1). Third, regarding this application being a CIP and the asserted implications thereof, applicant is directed to the discussion of priority above.

(c) Applicant is directed to the rejections using the Tabata reference as discussed above.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Edu E. Enin-Okut** whose telephone number is **571-270-3075**. The examiner can normally be reached on Monday – Thursday, 7 a.m. to 3 p.m. (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edu E. Enin-Okut/
Examiner, Art Unit 1727

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1727